Space Weather Forecast

Issued on Tuesday 8 October 2024 at 01:30 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate Storms easing day 1. Chance of further Strong class flares. S1-S2 Minor/Moderate Solar Radiation Storm likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with a strong (X-class) flare occurring from the complex and recently very active sunspot in the southwest at 07/1913 UTC. This occurred simultaneously with a long duration flare from another region just on or over the southwest limb, that also reached Strong levels. There are nine regions in total on the disc, with other regions of note including the large, mature but inactive region in the north-centre disc and two close vicinity regions in the southeast which have also remained inactive despite some slight complexity being evident on the larger of the two. A further new region is also rotating onto the disc from over the southeast limb.

The Strong flares produced two CMEs (coronal mass ejection), the first directed south and west of Earth, with the second on missing due to its location on the Suns west limb. Analysis is still ongoing with the south and west directed CME, however a glancing impact is possible, most likely 10 Oct. No other Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: Multiple weak CME enhancements were possible in this period, perhaps including the glancing influence of the 04 Oct CME, however nothing definitive was identifiable. The onset of any fast wind from a coronal hole also potentially occurred. Solar wind speed remained slightly elevated, between 400-500km/s. Interplanetary Magnetic Field was mainly Weak to Moderate, but rose to peak Strong at times. The north-south component of the magnetic field favoured a southward orientation with only brief spells northward, and also varied between Weak and Moderate levels. Geomagnetic activity was mainly at G1 Minor Storm, with a couple of G2-Moderate Storm intervals (07/1200-1500 and 07/1800-2100).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained largely at background but rose after 07/2325 UTC due to the strong flares. This rise is expected to continue.

Four-Day Space Weather Forecast Summary

Solar Activity: High to Moderate activity is expected, with a chance of further Strong-class flares before the complex and active region retreats onto the far-side through day 3 (10 Oct). Activity then easing to be Low to Moderate but with a slight chance of further strong-class flares from the other regions currently on the disc.

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Solar Wind / Geomagnetic Activity: There are no further Earth-directed CMEs currently modelled, however analysis is ongoing for the large and bright CME from the strong flares on 07 Oct, which may have a glancing component, most likely passing on 10 Oct (day 3). Otherwise the ongoing CME influence, along with any fast wind enhancement on day 1 (08 Oct) is expected to gradually ease. G1-G2 Minor to Moderate storms are likely to continue at first day 1 (08 Oct), easing to Quiet to Active with a chance of further G1 Minor Storms, and then mainly Quiet to Unsettled day 2 onward. Any further CME glance, most likely on day 3 (10 Oct) will bring a chance of further G1-G2 Minor to Moderate Storms.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to continue rising, likely reaching the S1-S2 Minor to Moderate Solar Radiation Storm thresholds. There is a chance of further enhancement given any further strong flares occur.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	10	30	1
Strong	G3	No	20	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	80	80	70	60
Very Active	R3-R5 (X Class)	Yes	40	40	20	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	70	50	20	10
Very Active	**≥ S3 ***	No	10	5	5	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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